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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/839,298 | 04/23/2001 | Michitaka Urushima | NEC01P030-HSc | 3167 |

7590 08/20/2003

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EXAMINER

GEYER, SCOTT B

| ART UNIT | PAPER NUMBER |
|----------|--------------|
| | 2829 |

DATE MAILED: 08/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|----------------------------|---------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 09/839,298 | URUSHIMA, MICHITAKA |
| | Examiner Scott B. Geyer | Art Unit 2829 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 05 June 2003.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-9,25,26 and 28-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) 3,5-8 and 25 is/are allowed.
- 6) Claim(s) 1,9,26 and 28-30 is/are rejected.
- 7) Claim(s) 2,4 and 31 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 09 August 2002 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413) Paper No(s). <u>15</u> . |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____. | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. After a personal interview on May 27th, 2003 between the examiner of record and the applicant's representative, claim language was presented by the applicant's representative to define over the previously cited references. Rejections based on the previous references of record have been withdrawn, as the amended claims defined over the prior cited references. New rejections are presented below based upon a newly discovered reference. Due to the introduction of a new reference for the purpose of rejecting claims, the instant office action is NON-FINAL.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2A. Claim 30 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 30 recites "said adhesive layer comprises a thermoplastic PI region having a thickness of 50 μm ". The specification does not define the meaning for "PI". The specification is also silent as to the meaning of "region" and to whether it covers the entire thickness of the adhesive layer or only a portion of the adhesive layer.

2B. Claim 30 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to

reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 30 recites "said adhesive layer comprises a thermoplastic PI region having a thickness of 50 μm ". The specification does not define the meaning for "PI". The specification is also silent as to the meaning of "region" and to whether it covers the entire thickness of the adhesive layer or only a portion of the adhesive layer.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3A. Claims 1,9, 26 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Baker et al. (5,579,573).

3B. As to **claim 1**, Baker et al. teach in figure 3 a semiconductor chip 14, a stud bump 16 provided on an electrode of the chip and an adhesive layer 12 provided on the chip 14. Further, the adhesive layer 12 has an adhesive surface facing away from the chip 14 and the stud bumps 16 project from the surface of the adhesive layer 12.

3C. As to **claim 9**, Baker et al. teach an adhesive layer comprising a thermoplastic with adhesion (see column 3, line 36 et seq.).

3D. As to **claim 26**, Baker et al. teach a top of the stud bump protruding from a lower surface of the adhesive layer.

3E. As to **claim 29**, Baker et al. teach thermosetting adhesive layers (column 4, lines 1 et seq.).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baker et al. (5,579,573).

5A. As to **claim 28**, Baker et al. teach all of the claimed limitations except for stud bumps comprised of gold. However, it is notoriously well known in the art of semiconductor devices to fabricate electrode stud bumps comprised of gold, and one of ordinary skill would have been motivated to provide stud bumps comprised of gold as gold is an excellent conductor of electricity and posses exceptional anti-corrosion properties.

Allowable Subject Matter

6. Claims 2 and 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art of record and to the examiner's knowledge does not teach or render obvious, at least to the skilled artisan, the instant invention regarding:

the device of claim 1 wherein the device is attached to an interposer through a thermo-compressive adhesive, in combination with the other claimed elements as in claim 2, and;

the device of claim 1 having an adhesion layer comprised of a thermoplastic resin which also has a thickness of 50 micrometers as in claim 31.

Claim 4 is dependent upon claim 2.

/

7. Claims 3, 5, 6, 7, 8 and 25 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record and to the examiner's knowledge does not teach or render obvious, at least to the skilled artisan, the instant invention regarding:

As to claim 3, an interposer adhered to a chip wherein the interposer is adhered through a cured flux and is electrically connected to bumps protruding from the adhesive layer on the chip, and wherein the adhesive layer on the chip comprises an adhesive surface facing away from the chip, in combination with the other claimed limitations;

As to claim 5, a wiring pattern adhered to a chip through an adhesive layer and partially bonded to bumps on the chip, wherein the bumps protrude from the surface of the adhesive layer on the chip, and wherein the adhesive layer on the chip comprises an adhesive surface facing away from the chip, and wherein an insulating and covering layer covers the wiring pattern and has selective openings to form external connections, in combination with the other claimed limitations;

As to claim 6, similar to claim 5, wherein the wiring pattern is adhered to the surface of the adhesive layer of the chip through a cured flux, in combination with the other claimed limitations;

As to claim 7, two or more devices wherein each device comprises a chip and an adhesive layer provided on the surface of the chip, and wherein bumps formed on electrodes of the chip protrude from the surface of the adhesive layer, and wherein part of a surface of one of the devices is adhered to part or all of a surface of another chip such that the devices are electrically connected to each other with the bumps, and wherein the adhesive layer comprises an adhesive surface facing away from the chip, in combination with the other claimed limitations;

As to claim 8, two or more stacked semiconductor devices, wherein each device comprises a chip having electrodes formed on the front and back, an adhesive layer formed on either the front or back of the chip and wherein a bump formed on the electrode is exposed at the surface of the adhesive, and wherein one of the devices is adhered to an underlying device through the adhesive in combination with the other claimed limitations;

As to claim 25, a chip having an adhesive layer and an electrode formed on the surface of the chip which is exposed through the surface of the adhesive layer, wherein the chip is adhered to a tape substrate with the adhesive and wherein an interposer is adhered to the opposite side of the tape substrate.

Claims 8 and 25 were also indicated as allowable in the previous office action, entered as paper no. 10.

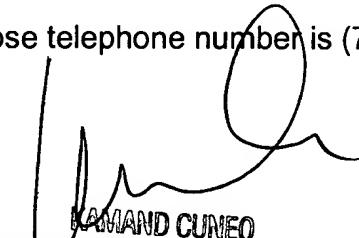
Conclusion

8. This action is **NON-FINAL**.
9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott B. Geyer whose telephone number is (703) 306-5866. The examiner can normally be reached on weekdays, between 10:00am - 6:30pm. E-mail: scott.geyer@uspto.gov

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (703) 308-1233. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

SBG
July 28, 2003



KAMAND CUNEO
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800